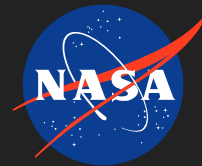


Bonding and Analysis of Composite TRAC Booms for NASA Science Missions, Phase I

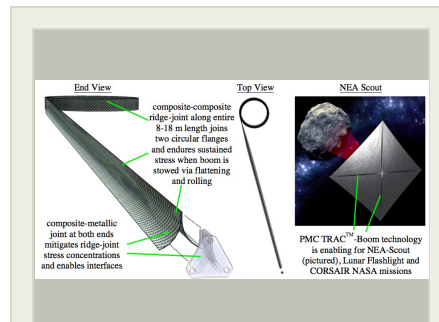
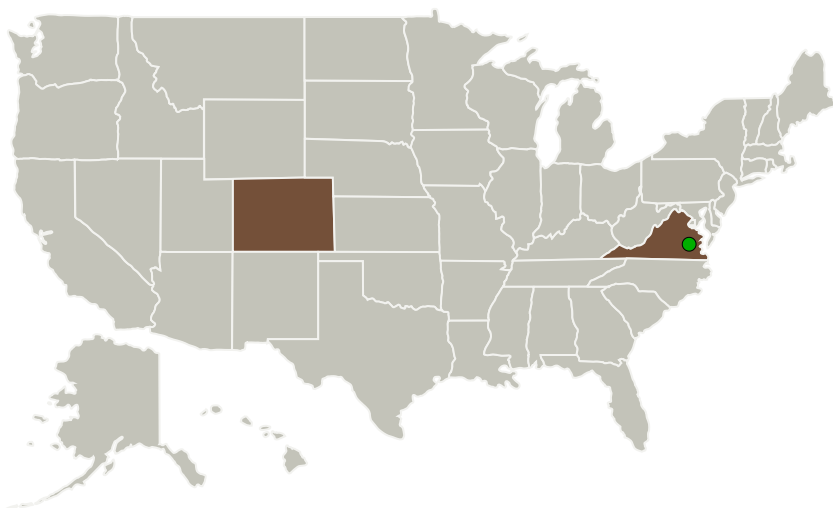
Completed Technology Project (2016 - 2016)



Project Introduction

A new deployable spacecraft boom technology called the Triangular Rollable And Collapsible Boom (TRACTM-Boom) has been invented by the Air Force Research Laboratory and is being considered by NASA for numerous missions including the Near Earth Asteroid Scout (NEA Scout) and Lunar Flashlight solar sail missions being developed by NASA Marshall Spaceflight Center as well as the CORSAIR comet sample return mission being developed by NASA Goddard. The greatest risk/concern voiced by these mission development teams related to composite TRAC? Boom technology is the highly nonlinear and time-dependent creep and stress relaxation behavior of the bonded ? ridge-joint? that joins the two circular flanges and endures sustained stress when the boom is flattened and stowed. To address this concern, Roccors proposes to improve the performance of the bondline in composite TRAC?-Booms by reinforcing the adhesive joint with high stiffness elements that allow higher packaging strains while minimizing creep. We also propose to validate a relatively low cost, out-of-autoclave process for affecting the bond, and validate analytical models to simulate the time- and temperature-dependent viscoelastic behavior of composite TRAC? bonded joint, and guide engineering qualification of the joints for future NASA missions. The results of the proposed Phase 1 program will include: 1) assessment of the feasibility of Roccors creep-resistant bondline technology, 2) validation of an engineering framework (through model and test correlation) for flight validation of composite TRAC?-Boom designs, and 3) development of a Phase 2 plan for elevation of the technology from TRL 3 to TRL 5 for future NASA flight applications.

Primary U.S. Work Locations and Key Partners



Bonding and Analysis of Composite TRAC Booms for NASA Science Missions, Phase I

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Organizations Performing Work	Role	Type	Location
Roccor, LLC	Lead Organization	Industry	Longmont, Colorado
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Colorado	Virginia

Project Transitions

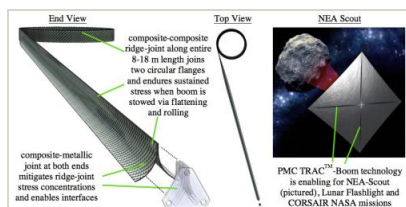
▶ **June 2016:** Project Start

✓ **December 2016:** Closed out

Closeout Documentation:

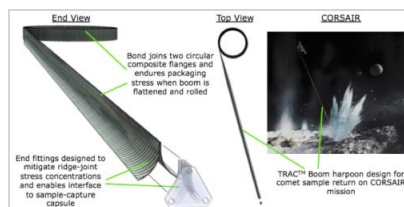
- Final Summary Chart(<https://techport.nasa.gov/file/139574>)

Images



Briefing Chart Image

Bonding and Analysis of Composite TRAC Booms for NASA Science Missions, Phase I
(<https://techport.nasa.gov/image/135207>)



Final Summary Chart Image

Bonding and Analysis of Composite TRAC Booms for NASA Science Missions, Phase I Project Image
(<https://techport.nasa.gov/image/130732>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Roccor, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

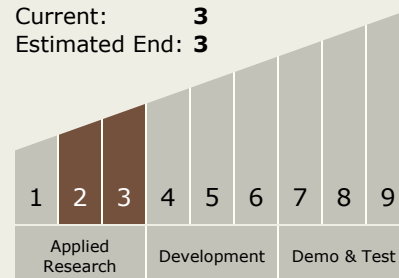
Carlos Torrez

Principal Investigator:

Thomas Murphey

Technology Maturity (TRL)

Start: 2
Current: 3
Estimated End: 3



Bonding and Analysis of Composite TRAC Booms for NASA Science Missions, Phase I

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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.2 Structures
 - └ TX12.2.1 Lightweight Concepts

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System